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Beemster et al.

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(54) **METHODS OF DISPLAYING AN ELECTRONIC PROGRAM GUIDE**

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(58) **Field of Classification Search**

None

See application file for complete search history.

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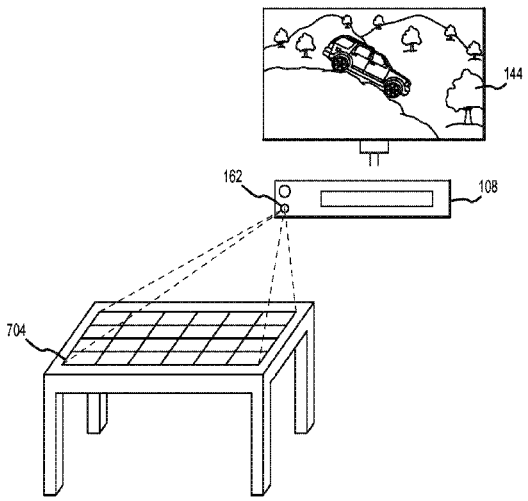
(57) **ABSTRACT**

A method of displaying an electronic programming guide, comprising: outputting a video signal from a receiver to a display device, the video signal including program service content for display on the display device; receiving a signal at the receiver, the signal including a command to display an electronic programming guide; in response to receiving the signal, determining if there is at least one viewer of the display device that does not want to view the electronic programming guide; and in response to determining that there is at least one viewer that does not want to view the electronic programming guide, projecting the electronic programming guide from the receiver to a projection surface.

5 Claims, 7 Drawing Sheets



(51) **Int. Cl.**

H04N 21/4223	(2011.01)
H04N 21/45	(2011.01)
H04N 21/482	(2011.01)
H04N 21/41	(2011.01)
H04N 13/04	(2006.01)
G06T 7/00	(2017.01)

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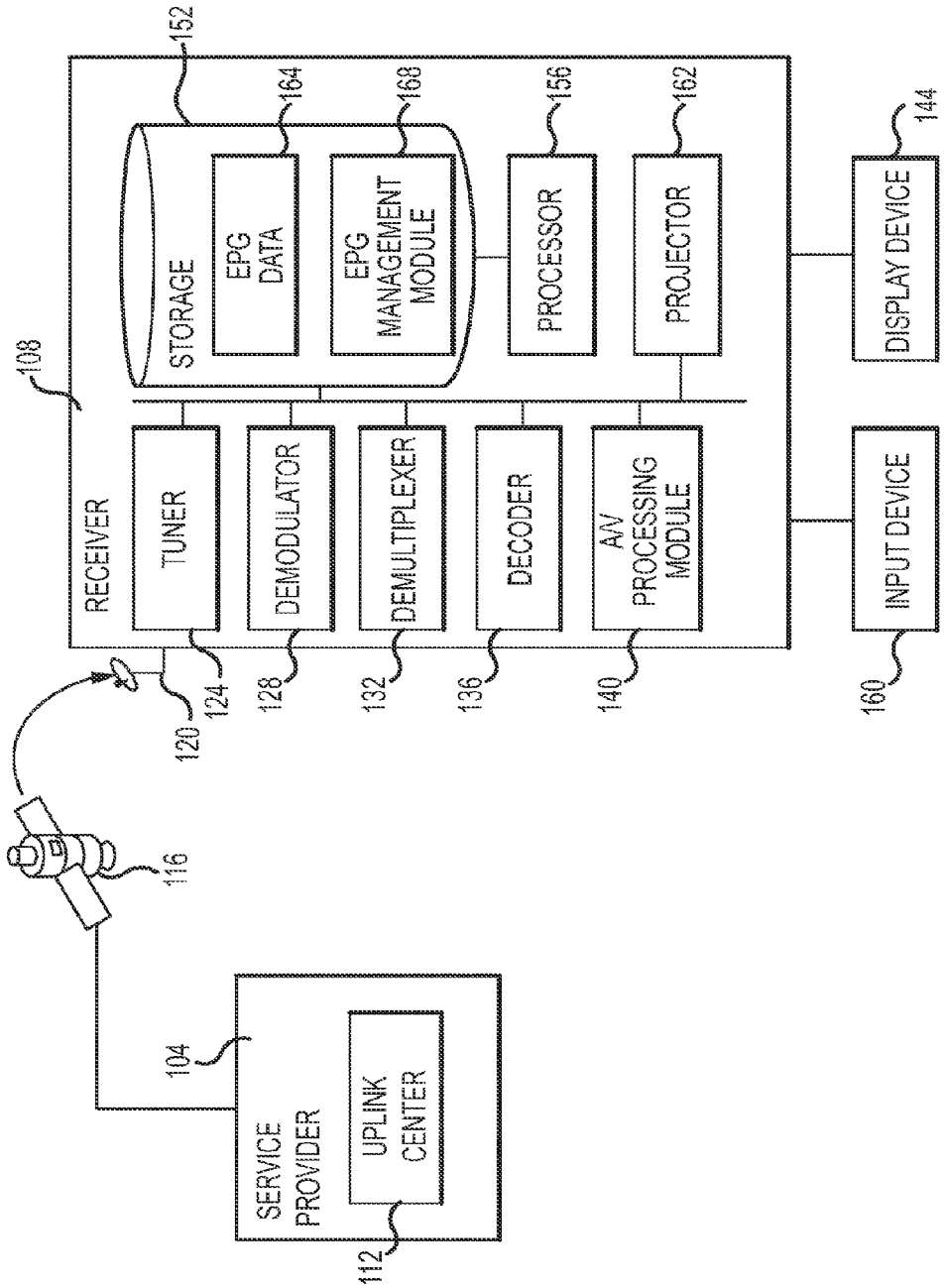
152
164
168
156
162
144
STORAGE
EPG DATA
EPG MANAGEMENT MODULE
PROCESSOR
PROJECTOR
DISPLAY DEVICE
108
RECEIVER
TUNER
DEMODULATOR
DEMULTIPLEXER
DECODER
A/V PROCESSING MODULE
INPUT DEVICE
120
124
128
132
136
140
160
116
104
SERVICE PROVIDER
UPLINK CENTER
112

FIG. 1

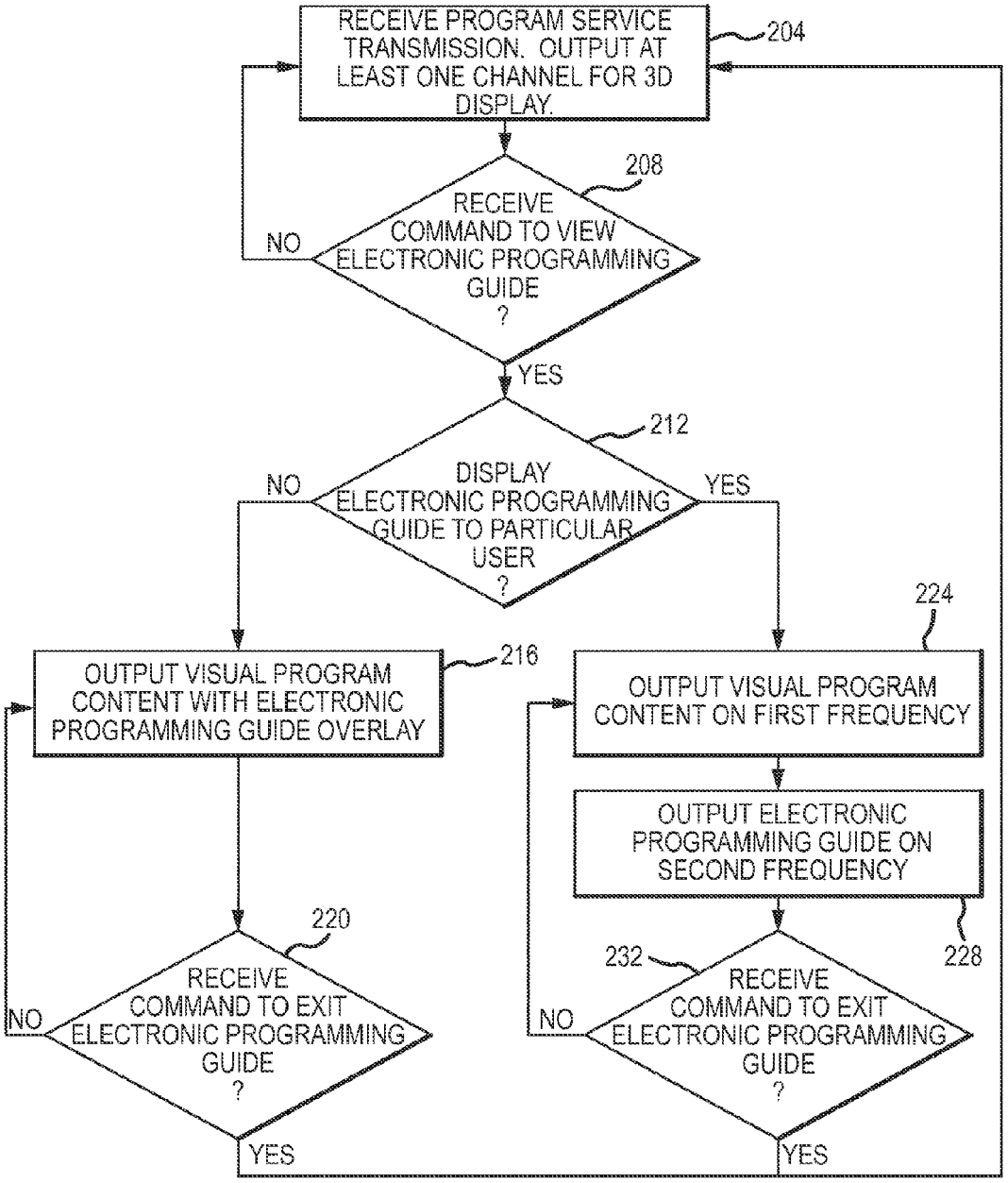
RECEIVE PROGRAM SERVICE TRANSMISSION. OUTPUT AT LEAST ONE CHANNEL FOR 3D DISPLAY.
204
208
RECEIVE COMMAND TO VIEW ELECTRONIC PROGRAMMING GUIDE ?
NO
YES
212
DISPLAY ELECTRONIC PROGRAMMING GUIDE TO PARTICULAR USER ?
NO
YES
216
OUTPUT VISUAL PROGRAM CONTENT WITH ELECTRONIC PROGRAMMING GUIDE OVERLAY
224
OUTPUT VISUAL PROGRAM CONTENT ON FIRST FREQUENCY
OUTPUT ELECTRONIC PROGRAMMING GUIDE ON SECOND FREQUENCY
228
220
RECEIVE COMMAND TO EXIT ELECTRONIC PROGRAMMING GUIDE ?
NO
YES
232
RECEIVE COMMAND TO EXIT ELECTRONIC PROGRAMMING GUIDE ?
NO
YES

FIG.2

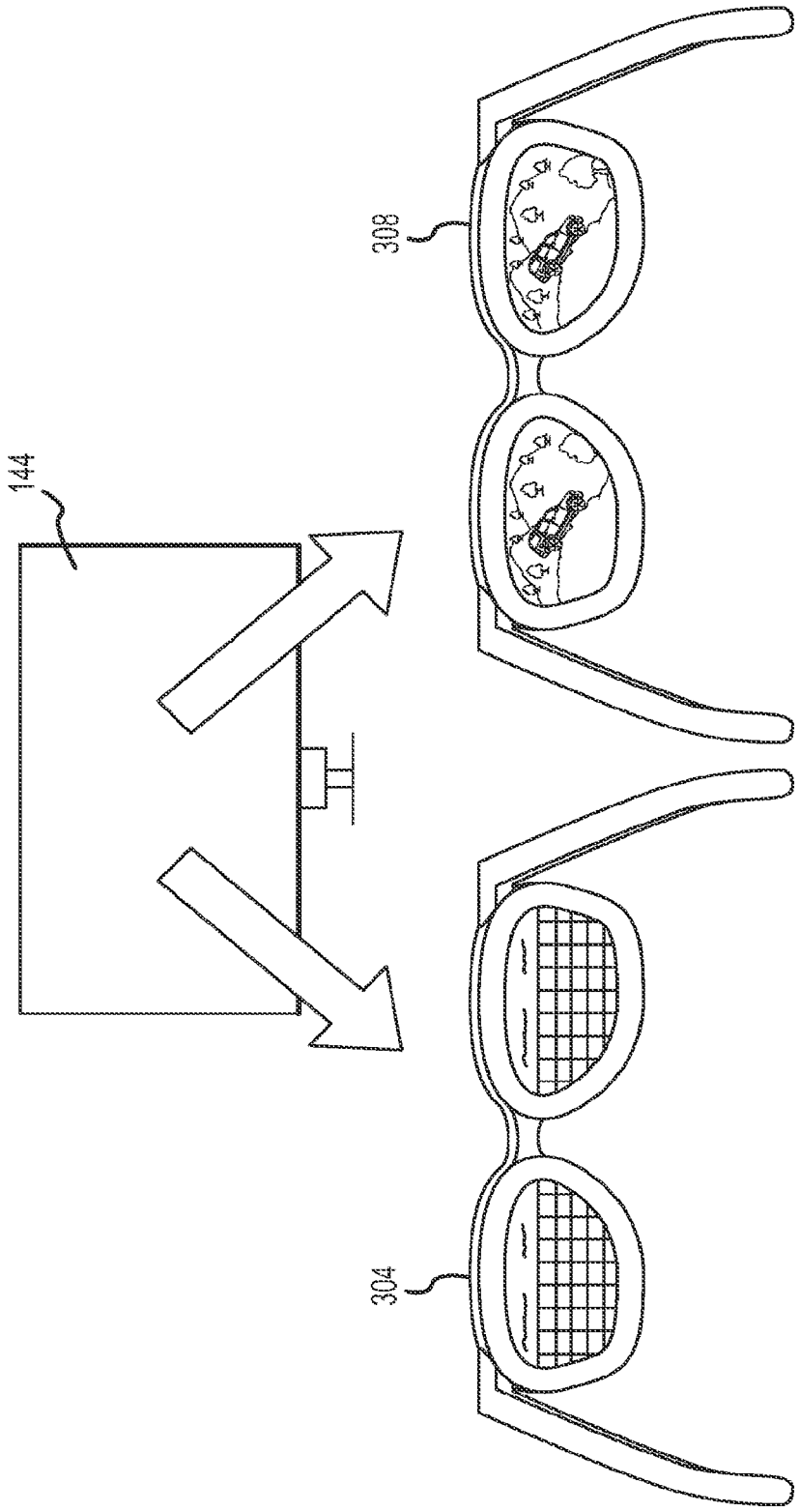

FIG.3

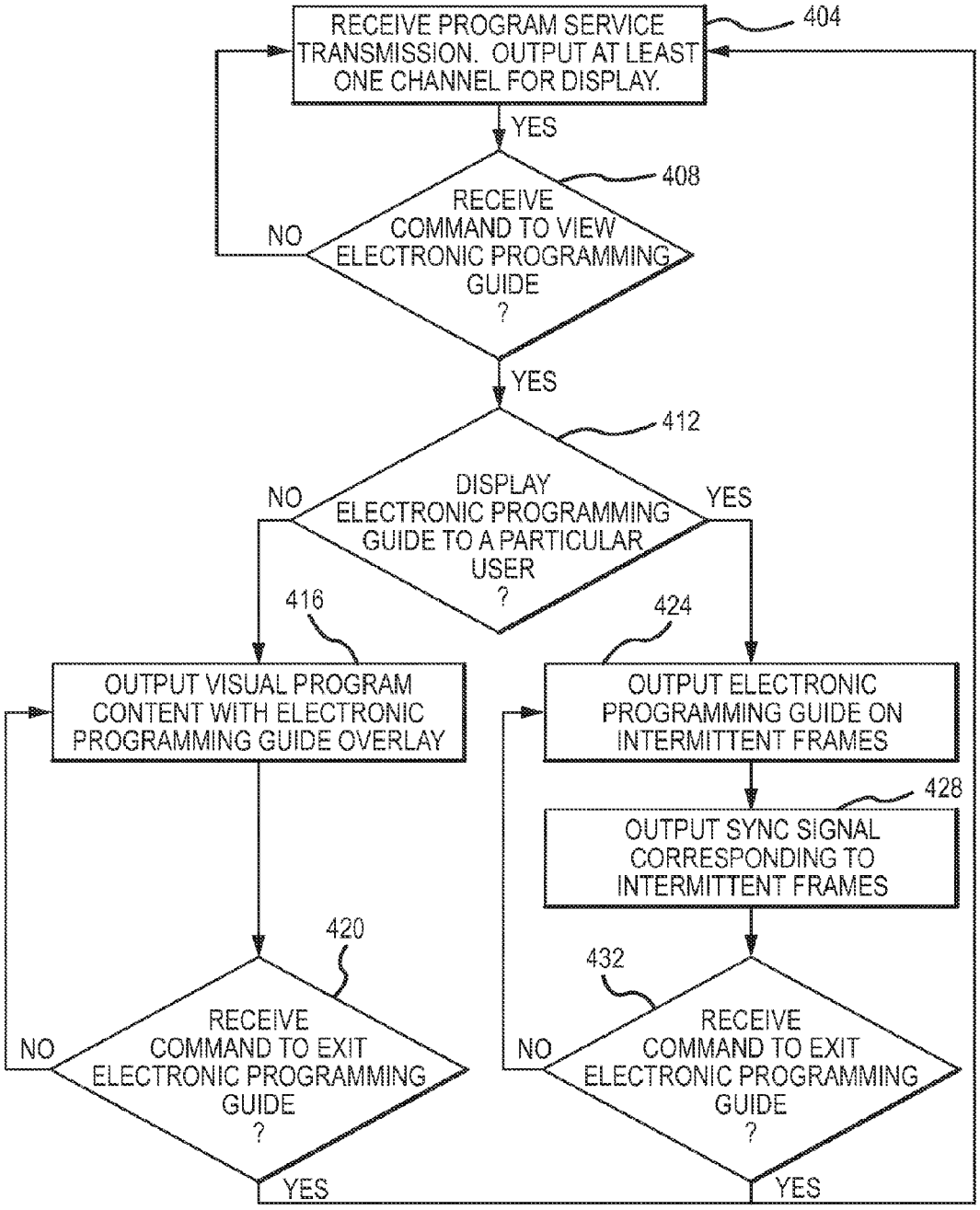
RECEIVE PROGRAM SERVICE TRANSMISSION. OUTPUT AT LEAST ONE CHANNEL FOR DISPLAY.
404
YES
RECEIVE COMMAND TO VIEW ELECTRONIC PROGRAMMING GUIDE ?
408
NO
YES
DISPLAY ELECTRONIC PROGRAMMING GUIDE TO A PARTICULAR USER ?
412
NO
YES
416
OUTPUT VISUAL PROGRAM CONTENT WITH ELECTRONIC PROGRAMMING GUIDE OVERLAY
424
OUTPUT ELECTRONIC PROGRAMMING GUIDE ON INTERMITTENT FRAMES
428
OUTPUT SYNC SIGNAL CORRESPONDING TO INTERMITTENT FRAMES
420
RECEIVE COMMAND TO EXIT ELECTRONIC PROGRAMMING GUIDE ?
NO
YES
432
RECEIVE COMMAND TO EXIT ELECTRONIC PROGRAMMING GUIDE ?
NO
YES

FIG.4

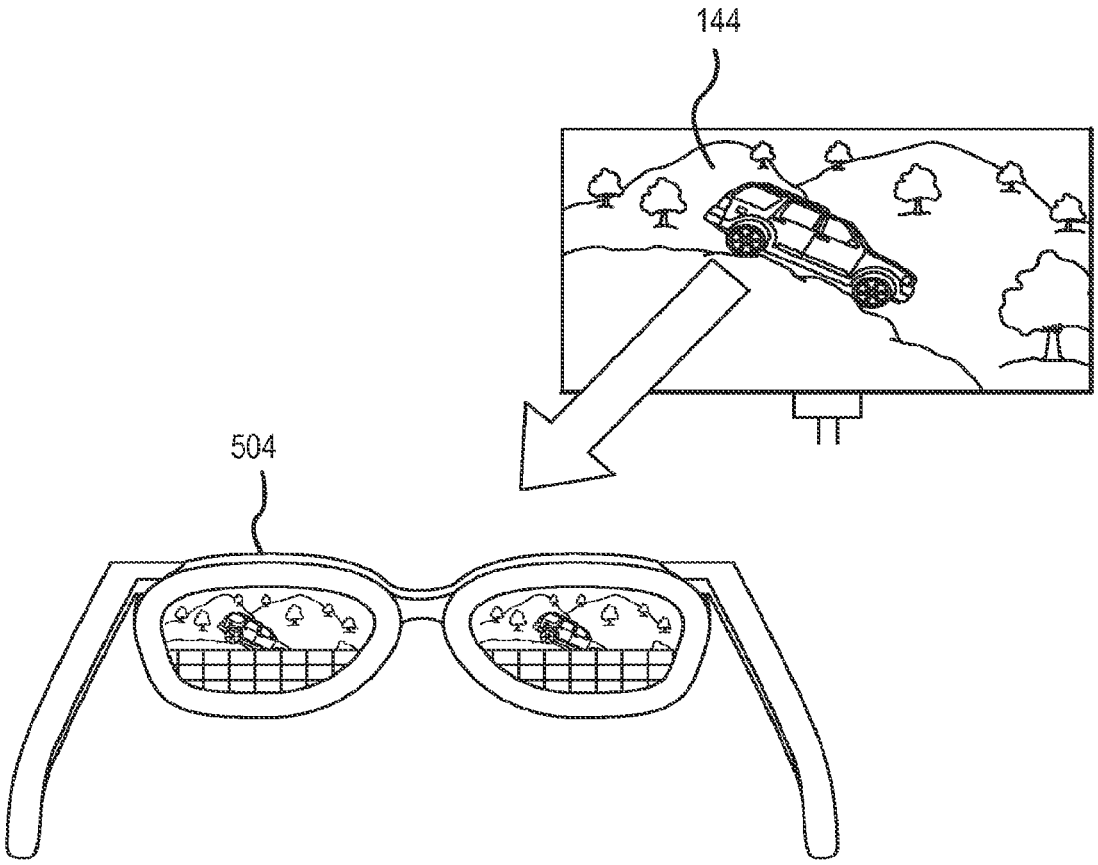

FIG.5

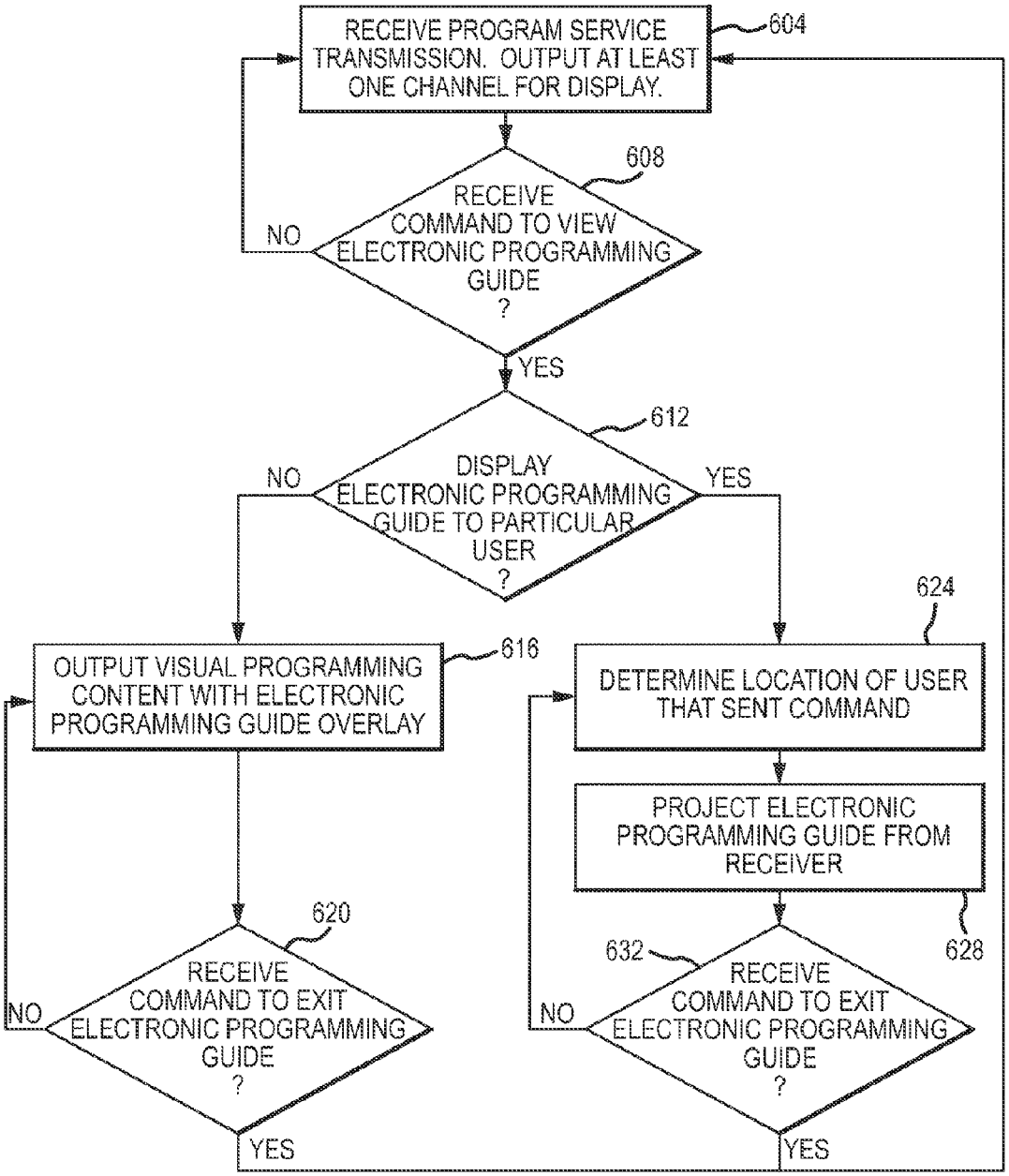
RECEIVE PROGRAM SERVICE TRANSMISSION. OUTPUT AT LEAST ONE CHANNEL FOR DISPLAY.
604
608
RECEIVE COMMAND TO VIEW ELECTRONIC PROGRAMMING GUIDE ?
NO
YES
612
DISPLAY ELECTRONIC PROGRAMMING GUIDE TO PARTICULAR USER ?
NO
YES
624
OUTPUT VISUAL PROGRAMMING CONTENT WITH ELECTRONIC PROGRAMMING GUIDE OVERLAY
616
DETERMINE LOCATION OF USER THAT SENT COMMAND
PROJECT ELECTRONIC PROGRAMMING GUIDE FROM RECEIVER
628
620
RECEIVE COMMAND TO EXIT ELECTRONIC PROGRAMMING GUIDE ?
NO
YES
632
RECEIVE COMMAND TO EXIT ELECTRONIC PROGRAMMING GUIDE ?
NO
YES

FIG.6

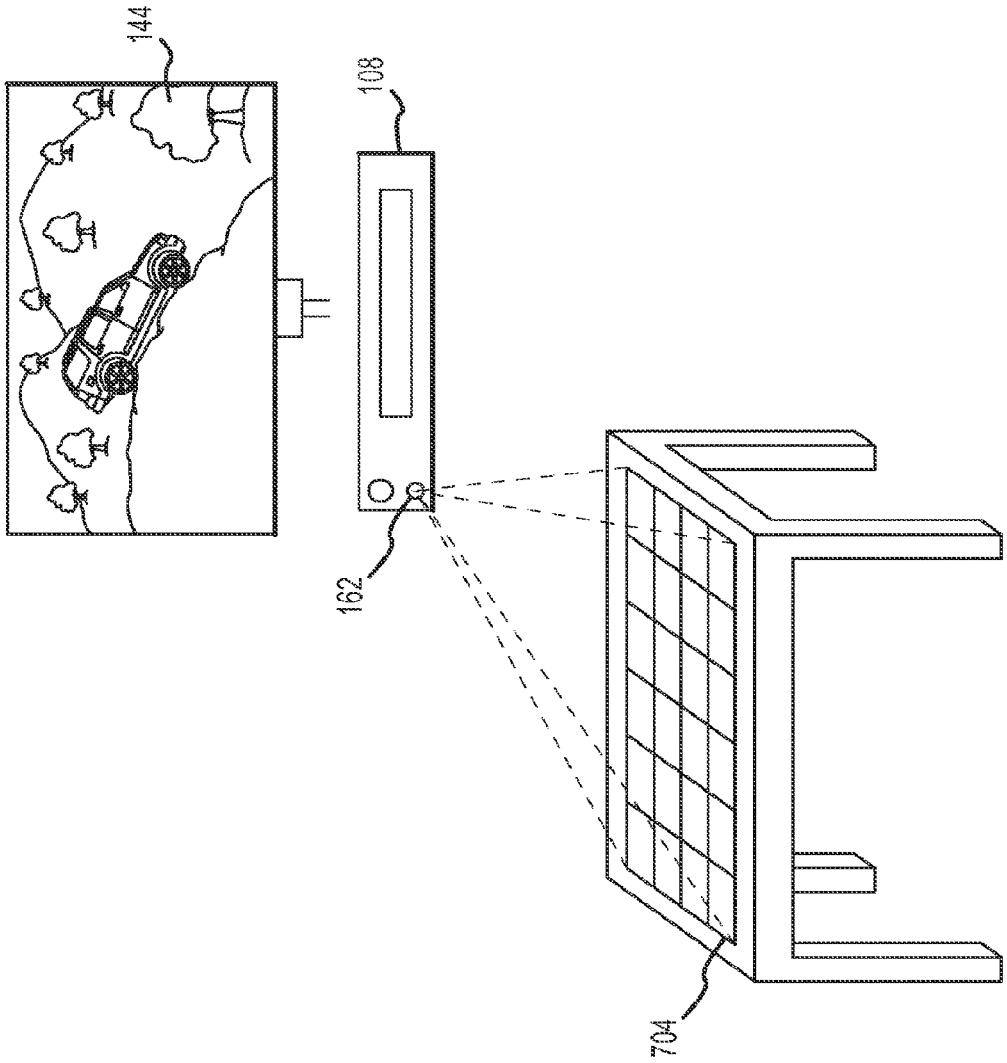

FIG. 7

METHODS OF DISPLAYING AN ELECTRONIC PROGRAM GUIDE

This application is a Division of U.S. patent application Ser. No. 13/237,772, filed Sep. 20, 2011, which in turn claims priority to European Patent Application No. 10177592.2 filed Sep. 20, 2010, entitled "Method of Displaying an Electronic Program Guide," both of which are hereby incorporated by reference herein in their entirety.

The present invention relates to methods of displaying an electronic program guide. For example, methods of the invention separate the display of the electronic program guide from the program content.

Cable television, satellite television, and other providers of program services typically include functionality for display of program guide information in their services. Program guide information may be viewed through an "electronic program guide" (EPG) menu that is enabled by a user through input to a receiver sent through an input device such as a remote control. The electronic program guide data typically includes program schedules, having such information as program channels and times in which various programs may be viewed on a particular channel. An EPG guide may be output in graphical form by way of a grid having channels corresponding to rows and time slots in the various columns of the grid. Once a user commands a receiver to display EPG guide information, the requested information is displayed as an overlay or otherwise over a portion of a display that is used to view a channel or other visual content from a broadcast service.

In some instances, the overlay of the EPG may interfere or partially interfere with viewing of a program service channel. This interference with the program service channel may be disruptive to one or more viewers. Specifically, the user input device may be operated by one individual who alone wishes to view the EPG. Others who are concurrently watching the television may not wish to view the EPG and may thereby have their viewing experience disrupted.

The present invention seeks to address this problem.

According to the present invention, there is provided a method of displaying an electronic programming guide, the method comprising:

outputting a video signal from a receiver to a display device, the video signal including program service content for presentation on the display device;

receiving a command signal at the receiver, the command signal commanding the receiver to display an electronic program guide;

and the receiver providing the electronic program guide in a manner such that its display does not interfere with the presentation of the program service content on the display device for some viewers;

wherein the electronic program guide is displayed on a first display surface which is distinct from a second display surface on which the program service content is displayed.

Embodiments of the invention enable the EPG to be displayed on the first display surface whilst the program continues on the second display surface. Therefore, the display of the EPG does not interfere with the presentation of the program content.

In an embodiment, where images on the display device are to be viewed using headsets, the first display surface is provided by a first headset and the second display surface is provided by a second headset.

Alternatively, the second display surface on which the program service content is presented is provided on the display device, and the first display surface on which the electronic program guide is displayed is a projection surface onto which the electronic program guide is projected by the receiver.

In a further embodiment, the second display surface on which the program service content is presented is provided on the display device, and the first display surface on which the electronic program guide is displayed is a display surface of a headset.

In an embodiment, altered 3D output signals are used such that one frequency of the output signal from the receiver contains an EPG data image and a second frequency of the 3D output signal contains visual content from the broadcast service transmission.

In another embodiment, an EPG is periodically inserted into video stream during predetermined frames, which are then captured and held by a synchronized headset.

In an alternative embodiment, an EPG image is output through a projector onto a projection surface.

In an embodiment, the method further comprises in response to receiving the command signal at the receiver, outputting a third signal and a fourth signal from the receiver, the third signal including program service content and the fourth signal including electronic program guide data; wherein the third and the fourth signal cause the electronic program guide to be visible on the first display surface and cause the program service content to be visible on the second display surface.

Preferably, the video signal is a combination of a first signal component on a first frequency and a second signal component on a second frequency, the first signal component and the second signal component together cause the display device to output an image that when viewed with a headset produces a three-dimensional image for the program service content;

the third signal is transmitted on the first frequency and the fourth signal is transmitted on the second frequency, the third and the fourth signal are sent to the display device to produce an image that is viewed with the aid of a first headset containing the first display surface and a second headset containing the second display surface;

the first headset filtering out content from the third signal and passing content from the fourth signal to produce the electronic program guide; and

the second headset filtering out content from the fourth signal and passing content from the third signal to produce a two-dimensional image for the program service content.

In an embodiment, the method further comprises receiving a fifth signal at the receiver, the fifth signal including a command to exit the electronic program guide; and

in response to the command to exit the electronic program guide, outputting a sixth signal from the receiver to the display device, the sixth signal including program service content for display on the display device, wherein the sixth signal is a combination of a first signal component on the first frequency and a second signal component on the second frequency, the first signal component and the second signal component together cause the display device to output an image that when viewed with a headset produces a three-dimensional representation for the program service content.

In an embodiment, the third and fourth signals may be combined, and the resultant combined signal may be output from the receiver to the display device.

Preferably, the display device includes the second display surface, and the third signal is sent to the display device to produce a program service image visible without the aid of a headset; and

the fourth signal is sent to the display device to produce an electronic program guide image that is visible with the aid of a first headset which includes the second display surface.

In this embodiment, the method may further comprise sending one frame of electronic program guide data on the fourth signal each time the third signal sends a predetermined number of video frames; and

outputting a synchronization signal from the receiver to the first headset, the synchronization signal corresponding to the occurrence of the electronic program guide frame in the fourth signal;

wherein the headset uses the synchronization signal to capture an image produced by the display device when the display device outputs an electronic program guide frame and to hold the captured image when display device does not output an electronic program guide frame.

In an embodiment, the display device includes the second display surface and the third signal is sent to the display device to produce a program service image; and

the first display surface is a surface of an object external to the receiver and the fourth signal is sent to a projector component of the receiver which projects an electronic program guide image onto the first display surface.

The present invention also extends to a method of displaying an electronic programming guide, comprising: outputting a first signal from a receiver to a display device, the first signal including program service content for display on the display device; receiving a second signal at the receiver, the second signal including a command to display an electronic programming guide; and in response to receiving the second signal at the receiver, outputting a third signal and a fourth signal from the receiver, the third signal including program service content and the fourth signal including electronic programming guide data; wherein the third and the fourth signal cause the electronic programming guide to be visible on a first display surface and cause the program service content to be visible on a second display surface.

For example, where the first signal is a combination of a first signal component on a first frequency and second signal component on a second frequency, the first signal component and the second signal component together cause the display device to output an image that when viewed with a headset produces a three-dimensional image for the program service content;

the third signal is transmitted on the first frequency and the fourth signal is transmitted on the second frequency, the third and the fourth signal are sent to the display device to produce an image that is viewed with the aid of a first headset containing the first display surface and a second headset containing the second display surface;

the first headset filtering out content from the third signal and passing content from the fourth signal to produce the electronic programming guide; and

the second headset filtering out content from the fourth signal and passing content from the third signal to produce a two-dimensional image for the program service content.

In an embodiment, the method further comprises:

receiving a fifth signal at the receiver, the fifth signal including a command to exit the electronic programming guide; and

in response to the command to exit the electronic programming guide, outputting a sixth signal from the receiver to the display device, the sixth signal including program service content for display on the display device, wherein the sixth signal is a combination of a first signal component on the first frequency and a second signal component on the second frequency, the first signal component and the second signal component together cause the display device to output an image that when viewed with a headset produces a three-dimensional representation for the program service content.

Alternatively, the method may further comprise:

combining the third and the fourth signal at the receiver to form a combined signal; and

outputting the combined signal from the receiver to the display device.

In an embodiment, the method further comprises:

separately outputting the third and fourth signals from the receiver;

receiving the third and fourth signals at the display device; and

combining the third and the fourth signals at the display device.

Preferably, the display device includes the second display surface, and the third signal is sent to the display device to produce a program service image visible without the aid of a headset; and

the fourth signal is sent to the display device to produce an electronic programming guide image that is visible with the aid of a first headset which includes the second display surface.

Preferably, the method further comprises:

sending one frame of electronic programming guide data on the fourth signal each time the third signal sends a predetermined number of video frames; and

outputting a synchronization signal from the receiver to the first headset, the synchronization signal corresponding to the occurrence of the electronic programming guide frame in the fourth signal;

wherein the headset uses the synchronization signal to capture an image produced by the display device when the display device outputs an electronic programming guide frame and to hold the captured image when display device does not output an electronic programming guide frame.

In an embodiment, the display device includes the second display surface and the third signal is sent to the display device to produce a program service image; and

the second display surface is a surface of an object external to the receiver and the fourth signal is sent to a projector component of the receiver which projects an electronic programming guide image onto the second display surface.

According to a further aspect of the present invention, there is provided a method of displaying an electronic programming guide, comprising:

outputting a video signal from a receiver to a display device, the video signal including program service content for display on the display device;

receiving a signal at the receiver, the signal including a command to display an electronic programming guide;

in response to receiving the signal, determining if there is at least one viewer of the display device that does not want to view the electronic programming guide; and

in response to determining that there is at least one viewer that does not want to view the electronic programming guide, projecting the electronic programming guide from the receiver to a projection surface.

Preferably, the projection surface is external to the receiver.

In an embodiment, in response to determining that there is not at least one viewer that does not want to view the electronic programming guide, the method comprises displaying the electronic programming guide as an overlay onto the program service content displayed on the display device.

Preferably, the operation of determining if there is at least one viewer of the display device that does not want to view the electronic programming guide comprises:

applying face and/or eyeball tracking to a viewer of the display device to determine a location on the display device on which the viewer is substantially focused;

if the location on the display device on which the viewer is substantially focused does not correspond to a region in which the electronic programming guide image is displayed, determining that the user does not want to view the electronic programming guide; and

if the location on the display device on which the viewer is substantially focused does correspond to a region in which the electronic programming guide image is displayed, determining that the user does want to view the electronic programming guide.

The operation of determining if there is at least one viewer of the display device that does not want to view the electronic programming guide may comprise receiving a command from a user input device that selects a mode of operation for the receiver;

evaluating the command that selects a mode of operation to determine whether a user has indicated that the electronic programming guide is not to be displayed on the display device.

Additionally, and/or alternatively, the operation of projecting the electronic programming guide from the receiver may comprise:

determining an approximate location of a viewer that does want to view the electronic programming guide; and

projecting the electronic programming guide in proximity to the viewer that does want to view the electronic programming guide.

The present invention also extends to a method of displaying an electronic programming guide, comprising:

outputting a video signal from a receiver to a display device, the video signal including program service content for display on the display device;

inserting a frame that includes an electronic programming guide image into the video signal each time a predetermined number of frames of the video have been output; and

outputting a synchronization signal from the receiver that indicates a display of the frame that includes the electronic programming guide image on the display device.

In an embodiment, the method further comprises:

receiving a first synchronization signal at a headset;

in response to receiving the first synchronization signal, capturing an image displayed on the display device at the headset; and

displaying the captured image through the headset until a second synchronization signal is received at the headset.

Preferably, the predetermined number of video frames is between 15 and 25, preferably between 19 and 21. In a preferred embodiment, the predetermined number of video frames is 20.

Preferably, the first headset includes an organic light emitting diode display.

In an embodiment, the first headset includes a camera.

Embodiments of the present invention will hereinafter be described, by way of example, with reference to the accompanying drawings, in which:

FIG. **1** schematically illustrates a service provider providing program transmissions to a receiver;

FIG. **2** is a flow chart illustrating a method of outputting an EPG image;

FIG. **3** is an illustration of a visual output in accordance with a method as illustrated in FIG. **2**;

FIG. **4** is a flow chart which illustrates another method of outputting an EPG image;

FIG. **5** is an illustration of a visual output in accordance with a method as illustrated in FIG. **4**;

FIG. **6** is a flow chart that illustrates a further method of outputting an EPG image; and

FIG. **7** is an illustration of a visual output in accordance with a method as illustrated in FIG. **6**.

Embodiments described herein provide an electronic program guide to one or more viewers in manner that does not interfere with the viewing experience of others. In an embodiment, altered 3D output signals are used such that one frequency of the output signal contains an EPG data image and a second frequency of the 3D output signal contains visual content from a broadcast service transmission. In another embodiment, an EPG is periodically inserted into video stream during predetermined frames, which are then captured and held by a synchronized headset. In another embodiment, an EPG image is output through a projector onto a projection surface.

As used herein, a "receiver" is any device capable of receiving video and/or audio content included in a broadcast or other program service transmission from a service provider. As used herein, a service provider includes any service that provides a program service transmission to a receiver such as, without limitation, a satellite television service, a direct television service or a cable television service. It should be understood that the term "program service transmission" generally embraces not only satellite or terrestrial broadcasts and/or narrowcasts but also transmission of information across any wired or wireless transmission medium. Accordingly, a "program service transmission" encompasses transmission of information across a cable network (for example a cable headend to cable receiver), an Internet or other computer-accessible medium (including a local area network, wide-area network, and so on), including Internet protocol television transmissions, a wireless network such as a radio frequency or infrared network, and so on.

FIG. **1** shows a service provider **104** that transmits or otherwise provides a program service transmission to a receiver **108**. The receiver **108** can include a set-top box (STB), Digital Video Recorder (DVR), a cable receiver, a general purpose computer and so on. The receiver **108** may also include a cable modem that receives streaming audio. The receiver **108** may be associated with an individual, business or other entity, user or subscriber that receives a program service transmission from the service provider **104**. The program service transmission may be received through a subscription to the service. Generally the terms "user" and/or "subscriber" refer to an individual or company who receives a program service transmission. This may include those who have purchased a subscription to the program service transmission. Alternatively, the terms "user" and/or "subscriber" may refer to individuals who have been given access to the program service transmission through promotional offers and/or other non-fee-based agreements.

In the context of a satellite television service, the service provider **104** may provide a program service transmission through an uplink center **112**. Implementations may utilize a direct broadcast satellite (DBS) system which can incorporate packetized transmission signals according to an appropriate standard, such as the MPEG-2 standard. The uplink center **112** may include a transmitter or other equipment operable to transmit a modulated signal having data representing audio and/or visual content. The modulated signal may be received at a satellite **116**, which in turn retransmits the modulated signal to be received at one or

more terrestrial locations. The modulated signal may be transmitted from the satellite **116** over an appropriate frequency band such as, for example, the C-band, the Ku-band or the Ka-band.

Direct broadcast satellite DBS signals may be received as downlinked signals by a satellite antenna **120**. The downlinked signals may be received by a tuner **124**, which selects a specific frequency range. The signals received by the tuner **124** may include a number of transponder signals received from one or more satellites **116**. A particular transponder signal may include a combination or multiplex of a number of transport streams associated with one or more channels. A particular transport stream may include, for example, compressed or uncompressed audio or visual data. By applying band-pass filtering techniques, the tuner **124** may select a particular transponder signal from the group of signals received from a low noise block filter (LNBF), associated with the satellite antenna **120**. The downlinked signals may be L-band.

The transponder signal selected by the tuner **124** may then be demodulated by the demodulator **128**. Specifically, the demodulator **128** removes the sinusoidal carrier signal and outputs the information carrying signal as a baseband signal. Output from the demodulator **128** may be directed to a demultiplexer **132**. The demultiplexer **132** may be an integrated circuit that accepts the packetized, time domain multiplexed data stream of the MPEG-2 transport stream and routes the packets to various components for further processing. In so doing, the demultiplexer **132** may separate out various transport streams that are contained in a particular transponder signal. A transport stream may include a number of packets having a unique packet identification (PID). In addition to routing packets of data, the demultiplexer **132** may also unscramble encrypted data and/or provide buffering of the MPEG data.

A number of transport streams may together form a service. As used herein, a "service" refers to a particular channel which is selected by a user. A particular video channel typically includes three transport streams: a video stream, an audio stream, and a data stream. When a user selects a service, for example, the demultiplexer **132** selects the appropriate audio and/or video transport stream and routes the audio and/or visual transport stream to a decoder **136**, which may process the various transport streams that are output from the demultiplexer **132**. The decoder **136** may include an audio decompressor portion that is operable to decompress an audio stream, and a video decompressor portion that is operable to decompress a video stream. The audio stream and video stream may be fully compliant audio and video program elementary streams as defined by, for example, ISO 13818-2 and ISO 13818-3 of the MPEG-2 standard, respectively. Output from the decoder **136** may be directed to an audio visual (A/V) processing module **140**. The A/V processing module **140** may process the video and audio streams using digital-to-analog conversion techniques. or compressed digital to uncompressed digital conversion techniques, to produce one or more output signals. The resulting baseband signals may then be sent to a output device **144** through appropriate connections. By way of example, the output device **144** may include a television, a monitor, and/or a speaker system, and so on.

Embodiments may operate with different product transmission services. Accordingly, although a satellite system is provided as an example of a program service transmission system, it should be understood that other networks or broadcasts for transmitting data may be used. For example, embodiments may be implemented for a cable service. In this case, the service provider **104** and the receiver **108** may communicate over a communication path that includes various combinations of local and wide area networks and/or the Internet.

The display device **144** may be a three-dimensional (3D) television. A 3D television **144** may be provided in association with one or more headsets which are operable to process light projected from the display device **144** in order to present a three-dimensional image to the wearer of a headset. A "shutter" system may be used in which a 3D image is constructed by two images, one for each eye, that are displayed in rapid succession on the display device **144**. The image for the right eye may be sent on a first frequency, and an image for the left eye may be sent on second frequency. The images may be sent using an appropriate data transmission protocol, such as High-Definition Multimedia Interface (HDMI). The images from the two frequencies may be interleaved or otherwise combined at the receiver **108** or at the display device **144** in order to produce a combined image produced by the display device **144**.

Using liquid crystal display (LCD) or other similar technology, the lenses of a headset may be arranged to become either transparent or opaque in order to convey an image to a particular eye. Thus, in order to convey an image to the right eye, the right lens becomes transparent and the left lens becomes opaque. Similarly, in order to convey an image to the left eye, the left lens becomes transparent and the right lens becomes opaque. In this way, two separate images, each having a slightly different viewing angle, are sent in rapid succession to each eye. The viewer's brain interprets the difference between the images as depth and, in so doing, unites the two images into one three-dimensional picture. In order to accurately convey the separate images to the left and right eyes, the headset may receive a synchronization or trigger signal from the receiver **108** that indicates when the headset should make the lens transparent or opaque. A "headset" generally refers to a helmet or glasses or other eyewear that is arranged to process the three-dimensional signals, as appropriate.

The receiver **108** may additionally include a projector **162** for projecting an image on a surface that is external to the receiver **108**. The projector may be used to project an EPG menu onto an external surface such as a table or a wall. In connection with projecting an EPG menu, the receiver **108** may include a face and/or eyeball tracking mechanism that is used to determine the location of a user who is viewing the EPG menu and/or to determine if a particular user is currently viewing the EPG menu. The projector **162** may be operable to directed the projected EPG menu in a particular direction or angle.

The receiver **108** may incorporate or use memory or other storage device **152**, such as magnetic or optical storage. A storage device **152** may store data received from the decoded satellite signal. The storage device **152** may be volatile or non-volatile memory implemented using any suitable technique or technology such as, for example, random access memory (RAM), disk storage, flash memory, solid state and so on. The storage device **152** may be located within the receiver **108** or may be separate from the receiver **108**. The storage device **152** may be removable. The stored data may include audio and/or visual content to be transmitted and output through the output device **144**. Such audio/visual content may include still images, video images, animation and/or audio. Portable Network Graphics (PNG) or other appropriate formats, such as for example, Tagged Image File Format (TIFF), Joint Photographic Experts

Group (JPEG), Motion Picture Experts Group (MPEG)-2, MPEG-4 may be used to display an image or video.

The receiver **108** may additionally include a processor **156** arranged to run executable code in connection with various functions associated with the receiver **108**, and generally to cause the receiver **108** to function and the display device **144** to display images. For example, the processor **156** may display graphics, images, animations or other content through the output device **144**. The storage device **152** may store an application, file, or other data that is useable by the processor **156**. As used herein, an application includes processor executable code that may be run to carry out one or more functions associated with the receiver **108**. "Processor executable code" includes any computer-readable media or commands that may be ultimately interpreted by a processor, such as HTML or XML files that are rendered into user-viewable applications by an application executed by the processor **156**.

An EPG management module **168**, which is stored in the storage device **152**, may be executed by the processor **156** to control output of an electronic programming guide (EPG) in a manner that is directed to particular users and/or does not interfere with others' enjoyment of program service content. In so doing, the EPG management module **168** may process an electronic program guide data that is received at the receiver **108**. The EPG data **168** may provide a schedule of program content and/or other features. As used herein, the terms "electronic programming guide" or "EPG" are intended to encompass an interface provided to a user as part of a program service transmission system that includes a schedule of programming content. The EPG may include a database or otherwise access a database containing information including, for example, names or titles of viewing or listening events (programs), corresponding channel numbers and names, brief descriptions of the programs, start and finish times, and rating and content information related to the events.

In addition to other functions, the EPG management module **168** may be arranged to output the EPG data **164** in a manner specifically directed to a particular user. The EPG management module **168** is able to alter a 3D output signal such that one frequency of the output signal contains the EPG data **164** and a second frequency of the 3D output signal contains visual content from the broadcast service transmission. Instead of directing separate images to different eyes, as is the case with 3D image output; the altered output signal may direct separate images to different headsets. Thus, the EPG management module may output separate synchronization or timing signals to the separate headsets. A first synchronization signal causes a first headset to make both of its lenses transparent when the EPG image is displayed, and both of its lenses opaque when the content from the broadcast service transmission is displayed. Similarly, a second synchronization signal causes a second headset to make both of its lenses transparent when content from the broadcast service transmission is displayed, and both of its lenses opaque when the EPG image is displayed.

The EPG management module **168** may be arranged to output the EPG data **164** periodically at predetermined frames. The EPG management module **168** may additionally output a synchronization signal to one or more headsets which provides timing information operable to allow the headset to capture the periodically displayed EPG image. The EPG management module **168** is operable to output EPG data **164** through the projector **162**.

The processor **156** may also perform such tasks as executing commands received from a user. User commands may be sent to the receiver **108** through a user input device **160** such as remote or other wireless device. As used herein, a "user input device" may include any device operable to receive input from a user and to convey the input to the receiver **108**. The user input device **160** may be a hand-held device having a number of buttons or keys which, when actuated by a user cause the user input device to covey information to the receiver **108** using a suitable communication means, such as an infrared signal. The user input device **160** may include a pointing device or functionality that allows the user to control the position of a cursor that is displayed on the output device **144**. For example, the user input device **160** may include a track ball or glide plane that may be manipulated to control cursor movements. The user input device **160** may include a motion sensor or accelerometer that allows a user to control displayed items or graphics, such as a cursor, through movements of his or her hand or arm that cause a displacement of the user input device **160**. It will be appreciated that other input devices such as a computer mouse or touch screen may be used and other communication means, wired or wireless, may be used. Information sent to the receiver **108** may include, for example, a command to change the output channel, a command to display a EPG and/or a command to navigate through the EPG.

FIG. **2** is a flow chart illustrating a method of outputting an EPG image. Initially, at operation **204**, the receiver **108** receives a program service transmission from the service provider **104**. As described above, this may include receiving a satellite transmission at a satellite antenna **120** and processing the received signal through the operation of a tuner **124**, demodulator **128** and so on. In addition to receiving and processing the broadcast service transmission, operation **204** includes outputting at least one channel from the program service transmission for display on the display device **144**. The channel output in operation **204** may be a three-dimensional video signal. Following operation **204**, operation **208** is executed.

In operation **208**, the EPG management module **168** determines if a signal has been received from the input device **160** that commands the receiver **108** to display electronic programming guide data. If, in operation **208**, no such command signal is received, operation **204** may follow such that program service content is continually received and displayed by the receiver **108**. If, in operation **208**, a command to view the electronic programming guide is received, operation **212** may be executed.

In operation **212**, the EPG management module **168** determines if the EPG image is to be output to a particular user. The user input device **160** may be operable to receive a command that indicates the manner in which the EPG image is to be output. In one mode, the EPG image may be output in the familiar manner, such that the image is overlain on top of other visual content. In another mode, the EPG image may be output to a particular user. Accordingly, if in operation **212**, the EPG management module **168** determines that the EPG image is to be displayed to all users, operation **216** may be executed. In operation **216**, the EPG data is output on top of or overlain on the program service channel that is currently output on the display device **144**. Following operation **216**, operation **220** may be executed.

In operation **220**, the EPG management module **168** determines if a signal has been received from the input device **160** that commands the receiver **108** to exit from the EPG guide display. If, in operation **220**, no such signal has been received by the receiver **108**, operation **216** may be executed following operation **220** such that the EPG image remains displayed on the display device **144**. If, in operation

220, an exit command is received, operation 204 may be executed following operation 220 such that a program service channel is output to the display device 144 without also displaying an EPG image.

If, in operation 212, the EPG management module 168 receives a command to display the EPG data 164 to a particular user, then operation 224 may follow operation 212. In operation 224, the channel or other visual content from the program service transmission is output from the receiver 108 on a first frequency. In outputting the channel or other visual content on the first frequency, the EPG management module 168 makes the visual content available to one or more users that are wearing a particular headset that is operable to receive that frequency. In so doing, the visual image seen by the user may shift from a three-dimensional image to a two-dimensional image. The signal carrying the first frequency and the signal carrying the second frequency may be combined at the receiver and sent to the display device as a combined signal. Alternatively, these signals may be sent separately from the receiver 108 to be combined together at the display device 144. Following or concurrently with operation 224, operation 228 may be executed. In operation 228, the EPG management module 168 may output a signal containing the EPG image on a second frequency. In so doing, the EPG management module 168 may make the EPG image visible or otherwise available to be seen by one or more individuals who are viewing the display device 144 with a headset operable to view the second frequency. As can be appreciated, the EPG data 164, like the program service output, is viewed to such a user as a two-dimensional image. Following operation 228, operation 232 may be executed.

In operation 232, the EPG management module 168 determines if a signal has been received by the receiver 108 that commands the receiver 108 to exit the electronic programming guide menu. If, in operation 232, no such command is received, operation 224 may be executed following operation 232 such that the visual content from the program service transmission and the EPG guide data are each output on separate frequencies. If, in operation 232, an exit command is received by the receiver 108, operation 204 may be executed following operation 232. Once operation 204 is again executed, the visual image received or seen by the first user may shift from a two-dimensional image back to a three-dimensional image. It should be appreciated that in the instance where the user, in operation 212, selects an electronic programming guide output to all users, the display of that data in operation 212 may be seen as a three-dimensional image along with other visual content that is concurrently shown.

FIG. 3 illustrates the visual output resulting from the method of FIG. 2. FIG. 3 includes a display device 144 that is provided in association with two headsets 304 and 308. The visual image produced by the headset 304 and the headset 308 corresponds to the output from the receiver 108 in operations 224 and 228, shown in FIG. 2. As can be seen in FIG. 3, each headset 304 and 308 is used to view the same projection surface, namely the screen of the display device 144. However, due to the filtering process associated with the headsets 304 and 308, each headset views a different image. The output from the display device 144 is a combination of both images seen through headsets 304 and 308. The headset 304 is operable to filter out the image that is viewed on the headset 308, namely the visual content from the broadcast service transmission. In so doing, the headset 304 is operable to pass through and thereby display the EPG data 164, which is transmitted on the first frequency. Similarly, the headset 308 is operable to filter out the content sent on the first frequency, and operable to pass through and thereby display content on the second frequency. Accordingly, through the headset 308, the visual content from the broadcast service transmission is visible as described above because only a single frequency is passed through the headset 308. The image seen therein is a two-dimensional rather than a three-dimensional image.

FIG. 4 is a flow chart illustrating a further method of outputting an EPG image. Initially, at operation 404, the receiver 108 receives a program service transmission from the service provider 104. As described above, this may include receiving a satellite transmission at a satellite antenna 120 and processing the received signal through the operation of a tuner 124, demodulator 128 and so on. In addition to receiving and processing the broadcast service transmission, operation 404 includes outputting at least one channel from the program service transmission for display on the display device 144. Following operation 404, operation 408 may be executed.

In operation 408, the EPG management module 168 determines if a signal has been received from the input device 160 that commands the receiver 108 to display electronic programming guide data. If, in operation 408, no such command signal is received, operation 404 may follow such that program service content is continually received and displayed by the receiver 108. If, in operation 408, a command to view the electronic programming guide is received, operation 412 may be executed.

In operation 412, the EPG management module 168 determines if the EPG image is to be output to a particular user. In this regard, the user input device 160 may be operable to receive a command that indicates the manner in which the EPG image is to be output. In one mode, the EPG image may be output in the familiar manner, such that the image is overlain on top of other visual content. In another mode, the EPG image may be output to a particular user.

Accordingly, if in operation 412, the EPG management module 168 determines that the EPG image is to be displayed to all users, operation 416 may be executed. In operation 416, the EPG data is output on top of or overlain on the program service channel that is currently output on the display device 144. Following operation 416, operation 420 may be executed.

In operation 420, the EPG management module 168 determines if a signal has been received from the input device 160 that commands the receiver 108 to exit from the EPG guide display. If, in operation 420, no such signal has been received by the receiver 108, operation 416 may be executed following operation 420 such that the EPG image remains displayed on the display device 144. If, in operation 420, an exit command is received, operation 404 may be executed following operation 420 such that a program service channel is output to the display device 144 without also displaying the EPG data 164.

If, in operation 412, the EPG management module 168 receives a command to display the EPG data 164 to a particular user, then operation 424 may follow operation 412. In operation 424, the EPG management module 168 is operable to output the EPG data 164 intermittently on selected frames. In one embodiment, the EPG management module outputs the EPG data 164 on a frame that is between every 15th and every 25th frame. In another embodiment, the EPG management module outputs the EPG data 164 on a frame that is between every 19th and every 21th frame. In still other embodiments, the EPG management module 168

outputs the EPG data on every 20th frame. Following operation **424**, operation **428** may be executed.

In operation **428**, the EPG management module **168** may output a synchronization signal to one or more headsets, which are used to view the display device **144**. The synchronization signal sent by the EPG management module **168** is used by the headset for timing purposes in order to capture the intermittent frames of EPG images displayed on the display device **144**. Specifically, once a synchronization signal is received by the headset, the headset captures and holds the frame having the EPG image. Once the EPG data frame is captured, the headset holds the captured frame until the next synchronization signal is received and the next EPG data frame is captured. Following operation **428**, operation **432** may be executed.

In operation **432**, the EPG management module **168** determines if a signal has been received by the receiver **108** that commands the receiver **108** to exit the electronic programming guide menu. If, in operation **432**, no such command is received, operation **224** may be executed following operation **432** such that the visual content from the program service transmission and the EPG guide data are each output on separate frequencies. If, in operation **432**, an exit command is received by the receiver **108**, operation **404** may be executed following operation **432**.

FIG. **5** illustrates visual content output by way of a method as illustrated in FIG. **4**. FIG. **5** includes a display device **144** and a headset **504**. The visual content displayed in FIG. **5** corresponds to output from the receiver **108** during operations **424** and **428**. As can be seen in FIG. **5**, the display device **144** outputs visual content from the program service transmission. Concurrently with this output, EPG data **164** is output through the display device **144** on intermittent visual frames. Because the EPG data is shown only on select frames, the EPG image is not visible to the unaided eye. Specifically, the EPG data appears and disappears too quickly to be seen by the unaided eye.

FIG. **5** additionally includes a headset **504** that is operable to catch the intermittent EPG image output through the display device **144**. As described in connection with FIG. **4**, the headset **504** receives a synchronization signal from the EPG management module **168** which provides timing information for the headset **504** to capture the intermittent EPG image output from the display device **144**. Accordingly, as can be seen in FIG. **5**, the image seen through the headset **504** is a combination of the visual content from the broadcast or program service transmission and the captured EPG image. In order to capture the EPG image, the headset **504** may employ an organic light emitting diode (OLED) in one embodiment. In another embodiment, the headset may employ the use of a camera.

FIG. **6** is a flow chart that illustrates a further method of outputting an EPG image. Initially, at operation **604**, the receiver **108** receives a program service transmission from the service provider **104**. As described above, this may include receiving a satellite transmission at a satellite antenna **120** and processing the received signal through the operation of a tuner **124**, demodulator **128** and so on. In addition to receiving and processing the broadcast service transmission, operation **604** includes outputting at least one channel from the program service transmission for display on the display device **144**. Following operation **604**, operation **608** may be executed.

In operation **608**, the EPG management module **168** determines if a signal has been received from the input device **160** that commands the receiver **108** to display electronic programming guide data. If, in operation **608**, no such command signal is received, operation **604** may follow such that program service content is continually received and displayed by the receiver **108**. If, in operation **608**, a command to view the electronic programming guide is received, operation **212** may be executed.

In operation **612**, the EPG management module **168** determines if the EPG image is to be output to a particular user. In this regard, the user input device **160** may be operable to receive a command that indicates the manner in which the EPG image is to be output. In one mode, the EPG image may be output in the familiar manner, such that the image is overlain on top of other visual content. In another mode, the EPG image may be output to a particular user.

In other embodiments, a user's desire to view or to not view an EPG may be determined apart from any specific input from the user. For example, the EPG management module **168** may applying face and/or eyeball tracking to a viewer of the display device to determine a location on the display device on which the viewer is substantially focused. If the location on the display device on which the viewer is substantially focused does not correspond to a region in which the electronic programming guide image is displayed, the EPG management module may determine that the user does not want to view the electronic programming guide. On the other hand, if the location on the display device on which the viewer is substantially focused does corresponded to a region in which the electronic programming guide image is displayed, the EPG management module may determine that the user does want to view the electronic programming guide.

If, in operation **612**, the EPG management module **168** determines that the EPG image is to be displayed to all users, operation **616** may be executed. In operation **616**, the EPG data is output on top of or overlain on the program service channel that is currently output on the display device **144**. Following operation **616**, operation **620** may be executed.

In operation **620**, the EPG management module **168** determines if a signal has been received from the input device **160** that commands the receiver **108** to exit from the EPG guide display. If, in operation **620**, no such signal has been received by the receiver **108**, operation **616** may be executed following operation **620** such that the EPG image remains displayed on the display device **144**. If, in operation **620**, an exit command is received, operation **604** may be executed following operation **620** such that a program service channel is output to the display device **144** without also displaying the EPG data **164**.

If, in operation **612**, the EPG management module **168** receives a command to display the EPG data **164** to a particular user, then operation **624** may follow operation **612**. In operation **624**, the EPG management module **168** is operable to determine a location of a user, specifically the receiver **108** may employ techniques such as face recognition or eyeball scanning to determine the location and perspective in which a user will view a surface on which the EPG data will be projected. Following operation **624**, operation **628** may be executed. In operation **628**, the EPG management module **168** is operable to project the EPG data **164** through the projector **162**.

In operation **632**, the EPG management module **168** determines if a signal has been received by the receiver **108** that commands the receiver **108** to exit the electronic programming guide menu. If, in operation **632**, no such command is received, operation **624** may be executed following operation **632** such that the visual content from the program service transmission and the EPG guide data are each output on separate frequencies. If, in operation **632**, an

exit command is received by the receiver **108**, operation **604** may be executed following operation **632**.

FIG. **7** is an illustration of a visual output from the receiver **108** arising from a method as in FIG. **6**. FIG. **7** includes a display device **144** and a receiver **108**. The display device **144** outputs visual content from the program service transmission. Concurrently with this output of a program service channel, the receiver **108** projects an EPG image on a projection surface **704**. As illustrated in FIG. **7**, the projection surface **704** may be a table which is nearby or in close proximity to the receiver **108**. In other embodiments, the projection surface **704** may be a wall, floor, ceiling, and so on.

While embodiments are discussed herein in connection with the exemplary satellite broadcast system shown in FIG. **1**, it should be appreciated that embodiments may be used in connection other types of networks or content delivery mechanisms. Generally, the disclosure includes content delivered from a provider to a receiver across or over a network. The network across which content may be delivered may include satellite system, such as the one shown in FIG. **1**. Alternatively, the network may include a cable television network, local area network, wide area network or the Internet. In connection with certain embodiments, a receiver may include a general purpose computer operable to receive data or other content across a network, such as a wide area network of the internet. In such embodiments, the computer may be configured so that a provider can access a web site, a file transfer protocol (FTP) site, a file sharing system or site, and so on. Moreover, the order of method operations, such those shown in FIG. **2**, FIG. **4** and FIG. **6**, may be changed.

It will be appreciated that variations in, and modifications of, the embodiments as described and illustrated may be made within the scope of the appended claims.

The invention claimed is:

1. A method of displaying an electronic programming guide, comprising:

outputting a video signal from a receiver to a display device, the video signal including program service content for display on the display device, wherein the receiver further comprises an image projector that is configured to project an image at a particular direction or angle outwardly from the receiver an onto a projection surface that is physically separate and spaced apart a distance from the receiver and the display device;

receiving a command signal at the receiver, the command signal including a command to display an electronic programming guide;

in response to receiving the command signal, determining that there is at least one viewer of the display device who does not want to view the electronic programming guide; and

in response to determining that there is at least one viewer who does not want to view the electronic programming guide, using the image projector of the receiver, projecting the electronic programming guide from the image projector of the receiver to the projection surface that is physically separate and spaced apart a distance from the receiver and display device, wherein the projection surface is also positioned at the particular direction or angle outwardly from the receiver.

2. The method of claim **1**, wherein the operation of determining that there is at least one viewer of the display device who does not want to view the electronic programming guide comprises:

applying face and/or eyeball tracking to a viewer of the display device to determine a location on the display device on which the viewer is substantially focused;

if the location on the display device on which the viewer is substantially focused does not correspond to a region in which the electronic programming guide image is displayed, determining that the user does not want to view the electronic programming guide; and

if the location on the display device on which the viewer is substantially focused does correspond to a region in which the electronic programming guide image is displayed, determining that the user does want to view the electronic programming guide.

3. The method of claim **1**, wherein the operation of determining that there is at least one viewer of the display device who does not want to view the electronic programming guide comprises:

receiving a command from a user input device that selects a mode of operation for the receiver;

evaluating the command that selects a mode of operation to determine whether a user has indicated that the electronic programming guide is not to be displayed on the display device.

4. The method of claim **1**, wherein the operation of projecting the electronic programming guide from the receiver comprises:

determining an approximate location of a viewer who does want to view the electronic programming guide; and

projecting the electronic programming guide in proximity to the viewer who does want to view the electronic programming guide.

5. The method of claim **1**, wherein the projection surface is selected from the group consisting of: a wall, a floor, and a ceiling.

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